

5.1 Composite Functions

Name _____ Period _____ Date _____

1. Given two functions f and g , the _____, denoted $f \circ g$, is defined by $f \circ g(x) =$ _____.
2. **True or False** $f(g(x)) = f(x) \cdot g(x)$.
3. **True or False** The domain of the composite function $(f \circ g)(x)$ is the same as the domain of $g(x)$.

Evaluate each expression using the values given in the table.

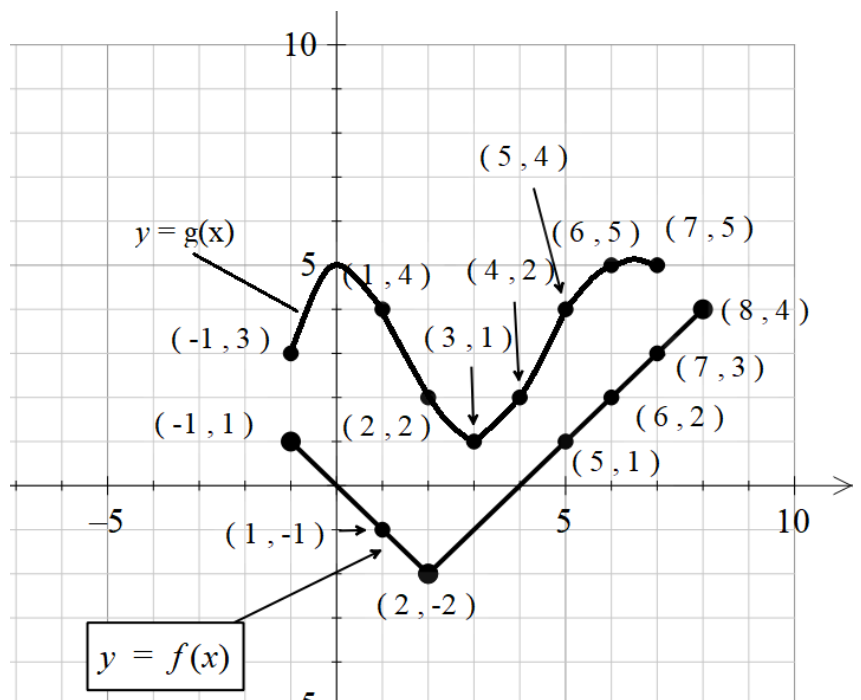
4.

x	-3	-2	-1	0	1	2	3
$f(x)$	-7	-5	-3	-1	3	5	7
$g(x)$	8	3	0	-1	0	3	8

- | | | |
|---------------------|----------------------|----------------------|
| a) $(f \circ g)(1)$ | b) $(f \circ g)(-1)$ | c) $(g \circ f)(-1)$ |
| d) $(g \circ f)(0)$ | e) $(g \circ g)(-2)$ | f) $(f \circ f)(3)$ |

Evaluate each expression using the graphs of $y = f(x)$ and $y = g(x)$ shown in the figure.

5. a) $(g \circ f)(1)$
- b) $(g \circ f)(5)$
- c) $(f \circ g)(0)$
- d) $(f \circ g)(2)$
- e) $(f \circ g)(-1)$
- f) $(f \circ g)(4)$
- g) $(g \circ f)(0)$
- h) $(g \circ f)(-1)$



Find the indicated composition function and its domain, using the given functions. Show work!

6. $f(x) = 3x + 2$

$$g(x) = x - 1$$

a) $h(x) = (f \circ g)(x)$

b) $h(x) = (g \circ f)(x)$

c) $h(x) = (f \circ f)(x)$

d) $h(x) = (g \circ g)(x)$

Find the indicated composition function and its domain, using the given functions. Show work!

7. $f(x) = x^2 - 1$

$$g(x) = \frac{1}{x-1}$$

a) $h(x) = (f \circ g)(x)$

b) $h(x) = (g \circ f)(x)$

c) $h(x) = (f \circ f)(x)$

d) $h(x) = (g \circ g)(x)$

8. $f(x) = \frac{1}{x-1}$

$$g(x) = \sqrt{x}$$

a) $h(x) = (f \circ g)(x)$

b) $h(x) = (g \circ f)(x)$

c) $h(x) = (f \circ f)(x)$

d) $h(x) = (g \circ g)(x)$

Evaluate each composition function using the given functions.

$$f(x) = 3x^2 - 1$$

$$g(x) = \sqrt{x-1}$$

$$h(x) = \frac{x-2}{x-3}$$

9. $(f \circ g)(1)$

10. $(g \circ f)(5)$

11. $(h \circ f)(4)$

12. $(g \circ g)(26)$

13. $(f \circ f)(-1)$

14. $(h \circ h)(4)$

Show that $(f \circ g)(x) = (g \circ f)(x) = x$.

15. $f(x) = x^3$; $g(x) = \sqrt[3]{x}$

16. $f(x) = 2x - 6$; $g(x) = \frac{1}{2}(x + 6)$

17. If $f(x) = \frac{x+1}{x-1}$, find $(f \circ f)(x)$.

18. If $f(x) = 2x^2 + 5$ and $g(x) = 3x + a$, find a so that the graph of $f \circ g$ crosses the y -axis at 23.

19. The volume V of a right circular cylinder of height h and radius r is $V = \pi r^2 h$. If the height is twice the radius, express the volume V as a function of r .

20. The volume V of a right circular cone is $V = \frac{1}{3} \pi r^2 h$. If the height is twice the radius, express the volume V as a function of r .

Review

21. Write the polynomial in factored form with zeros of -4, 2, 0.

22. Divide using synthetic division. $\frac{2x^4 - 3x^2 - 5x + 10}{x - 2}$

23. Factor. $20x^2 - 45y^2$